ERVING THE PROFESSION OF ENGINEERING

WESTERN SOCIETY OF ENGINEERS'

92 ND YEAR

Midwest Engineer

WILLIAM V. KAHLER

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1961 WASHINGTON AWARD RECIPIENT

MANAGEMENT DIVISION'S FIRST PROGRAM — Pages 4 - 5

ARCH, 1961 Vol. 13 No. 7

In $27-million project, trucks pounded test pavements night and day for two years

1.1 million load applications pound test pavements!

Sponsored by the American Association of State Highway Officials (AASHO), this great test will influence pavement design for years to come.

Never has there been a pavement study of such scope. On November 30th, near Ottawa, Illinois, the last trucks made their final runs—to complete the most exhaustive "in-use" testing ever given to pavements.

There were 5 test traffic loops. Each provided a range of representative concrete and asphalt pavement sections. These were pounded over and over by trucks of specified weight rolling at a steady 35 mph. At the end of two years of traffic, every surviving section had absorbed the impact of 1,100,000 loads!

Some 5,000 precision gages and measuring devices were installed in the test pavements. Special instruments were designed to measure changes in surface condition. Readings by the millions were recorded and processed through electronic computers. The thoroughness of the research reflects the scientific direction of the AASHO staff and the Highway Research Board of the National Academy of Sciences—National Research Council.

National Road Test findings will help solve today's problems in highway design and construction... assist engineers, officials and legislators in providing efficient, economical roads and streets in the years to come.

The fleet of trucks—from pickups to 54-ton semi-trailers —logged 17 million miles in circling five test loops.

PORTLAND CEMENT ASSOCIATION

111 West Washington Street, Chicago 2, Illinois

A national organization to improve and extend the uses of concrete

THIS MONTH'S FEATURES

Midwest Engineer

84 E. Randolph St., Chicago 1
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FULL REPORT ON 1961 WASHINGTON AWARD TO BE PUBLISHED IN APRIL ISSUE

The Washington Award for 1961, honoring William V. Kahler, was held at the Furniture Club of America, in Chicago, on March 2nd. Over 650 members and friends of the societies participating in the Award attended. After an informal reception at 5:30 p.m. and dinner at 7:00 p.m., Virgil E. Gunlock, chairman of the Washington Award Commission offered his remarks. Presentation of the token of the award—a plaque—was made by Raymond D. Maxon, president, Western Society of Engineers. Mr. Kahler then gave his address, entitled "Plowing A Straight Furrow."

A full report on the Award Program and highlights of Mr. Kahler's address will be published in the April issue of MIDWEST ENGINEER.

AIEE MATERIALS HANDLING CONFERENCE MEETS APRIL 11-12th IN CHICAGO

The 1961 AIEE Materials Handling Technical Conference, sponsored by the AIEE Materials Handling Subcommittee will be held April 11th and 12th at the Congress Hotel, Chicago. Program includes tours to see new applications. Ten papers will be presented with sixteen speakers participating in discussions.

Officers of the subcommittee are: R. F. Rice, Whiting Corp., chairman, and W. Kutcher, EC&M Div.-Square D Co., vice chairman.

ENGINEERS' WEEK BANQUET

Members I.S.P.E. of the various participating societies and their guests, comprising an attendance of 1,200, gathered at McCormick Place on the evening of February 23rd, for the Chicago Engineers' Week Banquet. As previously reported, the program featured an address "Man Into Space" by Charles L. Barker, Jr., Deputy Chief, Future Projects Design Branch, National Aeronautics and Space Administration, George C. Marshall Flight Center, Huntsville, Ala. The dinner was also the occasion for presentation of the ISPE Engineer-of-the-Year Award to Dr. John T. Rettaliata. (See News of Engineers Section). In addition there was the presentation of the ISPE Professionalism Award to Underwriter Laboratories with Mr. Mervin Brandon, president, accepting it from Mr. James Flood, vice president of the Chicago Chapter of ISPE. Mr. Flood made this presentation as well as that for Engineer-of-the-Year in the absence of Mr. Gerald M. Marks, who was unable to attend because of illness.

Representing the sponsoring societies were Raymond D. Maxon, president, Western Society of Engineers; Robert L. Hall, president, American Society of Civil Engineers, Illinois Section; E. J. Carraro, chairman, American Society of Mechanical Engineers, Chicago Section; William T. Larner, chairman, American Institute of Electrical Engineers, Chicago Section; Ted F. Meinhold, chairman, American Society of Chemical Engineers, Chicago Section and Col. John T. O'Neill, president, Society of American Military Engineers, Chicago Section and James L. Flood, vice president, Illinois Society of Professional Engineers, Chicago Chapter.

Hans Hasen, Harza Engineering Co., was chairman and treasurer of the 1961 Engineers' Week Committee.

John M. Johnston, associate Editor of the Chicago Daily News was Master of Ceremonies.

Calendar of Chicago Engineering

—MAR. 28, General Meeting and Dinner Social Hour (5:15-6:15 P.M.) Dinner (6:15). Dinner Speaker (7:15-7:45) Technical Session (8:00). At WSE Hq.

—APR. 5, WSE Noon Luncheon Meeting (12:00 Noon). At WSE Hq.

—APR. 12, WSE Noon Luncheon Meeting (12:00 Noon). At WSE Hq.

—APR. 19, WSE Noon Luncheon Meeting (12:00 Noon). At WSE Hq.

—APR. 19, Civic Committee Meeting and Dinner. 6:15 P.M. At WSE Hq.

—APR. 25, General Meeting and Dinner and Social Hour (5:15-6:15 P.M.) Dinner (6:15) Dinner Speaker (7:15-7:45) Technical Session (8:00). At WSE Hq.

First Management Program a Hit — Draws 200 to Feb. 8th Luncheon

Response to talk on "Index Numbers" by A. F. Birmingham of A. T. & T. reflects tremendous interest in applications of new management tool.

L. to R.: Paul T. Blatchley, Plant Supervisor, I. B. T. Co.; G. E. Hanson, A. T. & T. Co. District Plant Superintendent, Springfield, Ill.; O. L. Dodge, Division Plant Superintendent, A. T. & T. Co.; A. F. Birmingham, Staff Supervisor, A. T. & T. Co., Springfield; WSE Trustee, W. T. Sayner, Staff Supervisor, A. T. & T. Co., Chicago; Virgil E. Gunlock, Chairman of CTA.

The first program of the new Management Division was presented on February 8th. It was a joint enterprise with the Wednesday noon luncheon series. As announced in *Midwest Engineer* (January), the subject was "Index Numbers as a Tool of Modern Management," with A. F. Birmingham as the speaker. Mr. Birmingham is Staff Supervisor, A. T. & T. Co., Springfield, Ill.

In addition to guests of note from Chicago there were a number who came from a distance. These included: A. T. & T. Co's. Area Plant Manager, B. C. Hurley from Kansas City; District Plant Superintendents H. L. Stucky of Minneapolis, Clarence Link of Omaha. George E. Hanson of Springfield; and Staff Supervisor Walker J. Coffey of Kansas City.

The editors of the two leading communication journals, Ralph C. Reno of *Telephony* and John G. Reynolds of *Telephone Engineer and Management* were there. The president of Automatic Electric Laboratories, Frank D. Reese, and Hubert Tremblay of ITT-Kellogg represented the Independent Telephone Industry.

Local guests included W.S.E. Trustee Virgil E. Gunlock, Chairman of CTA; W.S.E. Treasurer Ernest R. Hendrickson, Operating Manager of Commonwealth Edison; Stanley W. Tucker, Maintenance Engineer I.B.T.Co.; Paul T. Blatchley, Plant Supervisor, I.B.T.Co.; Edwin N. Asmann, General Statistician, I.B.T.Co.; Oscar F. Gilbertson, Asst. Superintendent of Engineering, W.E.Co.; District Plant Superintendents Stanley M. Arnold and J. E. Greek of A. T. & T. Co.

Otis L. Dodge, Division Plant Superintendent of A. T. & T. Co. introduced Mr. Birmingham. W.S.E. Trustee Maurice W. Lane, Superintendent Manufacturing Engineering at W.E.Co. Hawthorne, monitored the meeting on behalf of W.S.E. Trustee Robert H. Bacon, "founder" of the Division who was in Florida.

L. to R.: E. R. Hendrickson, Operating Manager of Commonwealth Edison Co.; E. N. Asmann, General Statistician of I. B. T. Co.; W. J. Coffey, Staff Supervisor of A. T. & T. Co., Kansas City; J. G. Reynolds, Editor of Telephone Engineer and Management; Hubert Tremblay, Manager of Marketing and Sales, Communications ITT-Kellogg; Oscar F. Gilbertson, Superintendent of Engineering, W. E. Co.

The meeting itself had some good index results. It was a complete sell-out with every seat in the dining room filled. Other luncheons have had greater attendance but they were planned with more seating and there were some unfilled seats. This scored 100%.

An unusually large number of membership inquiries and proposals originated. The subject elicited a greater than usual response. One large local company started immediately a program to establish a results-reporting system patterned after the system described by Mr. Birmingham. A suburban high school asked for copies of the booklet handed out at conclusion of the talk. (The son of a

listener showed it to his teacher who immediately made it the subject of a class discussion and wanted copies.) Another company asked for extra copies.

William V. Sayner was manager of the meeting. Besides introducing all the special guests he gave a brief outline of the history and functions of the Society from notes prepared by Ernest Hendrickson.

Part of the crowd that overflowed the 5th floor WSE dining room on Feb. 8th is shown here.

L. to R.: B. C. Hurley, Area Plant Manager of A. T. & T. Co., Kansas City; R. C. Reno, Editor of Telephony; Frank D. Reese, President of Automatic Electric Laboratories, and S. W. Tucker, Maintenance Engineer, I. B. T. Co. (WSE Trustee Maurice W. Lane, Superintendent Manufacturing, W. E. Co. was seated left of Tucker, but was away from the table when this picture was taken.)

Use Aerial Photos in Computing Highway Earthwork Quantities

Use of aerial photography and photogrammetric methods for computing final earthwork quantities on highway projects in Ohio was described at the 40th Anniversary meeting of the Highway Research Board held recently in Washington.

In a paper entitled "Photogrammetric Measurements of Cross Sections for Pay Quantities," R. H. Sheik, engineer of photogrammetry of the Ohio Department of Highways, described the accuracy and speed of photogrammetry for this traditionally slow process.

"The time consuming methods of measuring cross sections of major highway projects has always presented a perplexing problem," Sheik said. "Ohio is meeting this problem today by photogrammetric measurements to determine earthwork quantities. Final payments to contractors on major projects are now based upon information obtained in this manner," he said.

"We began measuring cross sections for pay quantities by photogrammetry in 1956. It is believed this was the first attempt ever made on a highway project to secure measurements by this method. The results proved satisfactory in every respect.

"The import of this operation was not realized until the advent of electronic computers and digitizing read-out devices for stereo-plotters in the highway field.

From January to October, 1960, the Ohio department took final cross sections for pay purposes by photogrammetric methods on 231 miles of major highway. The determinations by the photogrammetric process on 10 large jobs (over one million cubic yards) proved to be within 1/5th of 1% of quantities estimated originally.

IS IT THE PROPER THING TO DO?

NOTE: This column deals with standards of conduct in the engineering field. The editor invites comments and criticisms on the ethical problems considered herein. Questions submitted on engineering ethics will be given careful attention. You should address your letter: The Editor, Midwest Engineer, 84 E. Randolph St., Chicago 1, Ill.

SITUATION: A professional engineer is employed in industry in a primarily technical position. He is requested by his management to prepare a proposal in answer to a government purchase request relating to the development of a military system. He is convinced through his analysis that either:

a. The proposed development is not feasible, or only partially feasible, or
b. The proposed development is economically unsound, or
c. The proposed development is not in the best national interest due to conflicts with plans of a government agency other than that issuing the purchase request.

The engineer has advised his management of his reservations. Over his objections, he is nevertheless instructed to prepare the proposal.

QUESTION 1: What is his best course of action, under each of the three postulated conditions?

QUESTION 2: Should his action differ if his position is primarily of a managerial rather than technical type?

It is to be assumed throughout that preparation of a proposal in spite of the postulated conditions will be of financial benefit to his employer.

REPLY: 1. As to facts (a)—The engineer's report or proposal should indicate that the proposed development is not feasible or partially feasible as the case may be.

As to facts (b)—In view of the fact that this is a military system wherein the cost is unimportant to achieve a specific result, the engineer should proceed with the proposal.

As to facts (c)—The engineer should call the attention of his superiors to the conflict of agencies and suggest that the conflict be resolved to the agencies involved. Failing to convince his superiors, he may follow the instructions of his superiors. Then it is their responsibility.

REPLY: 2. If engineer has managerial responsibility, his obligations to pursue above course are simply greater.

It is relevant to point out that the engineer may not have available to him all of the facts which would permit him to reach a decision relative to the overall military program.*

*An opinion of the Panel on Engineering Ethics of the Division on Education and Research of the Western Society of Engineers.

COMMENTS AND DEVELOPMENTS

"The railroad is still the most efficient tool for carrying large numbers of passengers at peak loads with speed and reliability," said W. W. Patchell, vice president, Special Services, Pennsylvania Railroad Co. at a recent conference sponsored by Northwestern University's Transportation Center. Conceding that the railroads cannot match air transport for long distance travel, he said that intercity travel for distance of 100 to 300 miles will need rail transportation.

He pointed out that rail lines can take three times their present load. Emphasizing the heavy load that mass transportation involves, he cited the Congress Street Expressway with its four lanes in each direction and two CTA tracks in the middle. Private automobiles and buses are moving people at a peak of 7,650 per hour. Contrasted with this, one track of rail line is moving 12,350 people per hour. This is only 25% of total capacity. If the rail line were abandoned, seven additional expressways would have to be constructed for private automobiles plus two more lanes for buses, concluded Mr. Patchell.

A NEW COMMUNICATION SYSTEM that transmits voices on infrared beams was announced yesterday by the Aeronautical division of Minneapolis-Honeywell Regulator company.

The sending and receiving units in the system are shaped like guns which are aimed at each other for the transmission of a narrow infrared beam. Words spoken into the gun are converted electrically into infrared and transmitted silently to the receiver, which converts the message back into sound.

The company said small hand-held units can be used for communication between points up to three miles apart, while larger systems have a range of up to 20 miles. The system is called Maxsecom.

INVENTORY OF KEY MINERAL SOURCES HERE AND ABROAD NEEDED

. . . says former Mining Bureau official

Charles Will Wright, a former Chief of the Mining Division, U.S. Bureau of Mines, has urged, in the current issue of "Mining Engineering," that "events demand an inventory of our sources of key mineral commodities here and abroad, to provide a realistic future strategic picture, to assist mine owners at home and abroad in planning future developments."

The magazine is the official monthly publication of the Society of Mining Engineers, a constituent organization of the American Institute of Mining, Metallurgical, and Petroleum Engineers.

Foreign Sources Doubtful

"The probability that certain metals, in which we now are deficient, may not be available from foreign sources at the end of the decade is a growing danger," the author warns. "At present, when countries are nationalizing their industries and, in some cases, depriving us of hitherto certain sources, the United States should start planning for its mineral future to meet growing industrial requirements."

Trade Wars

Stating that "an aggressive economic trade war is in progress," the writer says that a number of imports "could be blocked by communist led strikes at shipping ports or mines, or by other means of controlling or curtailing output from foreign metal mines." The author points out that the United States now imports more than 90 percent of its nickel, beryllium, columbium, antimony; all its tin; 85 percent of its manganese, chromite, and bauxite, as well as a high percentage of other essential minerals. He feels it fortunate that most of our nickel comes from Canada and our antimony from Mexico.

The article advises that the Bureau of Mines effect "as comprehensive positive program for an intensive development of our low-grade or marginal deposits." It calls for long-term commercial contracts with foreign metal miners at specific prices and goes on to say: "With such assurances, mine owners would be justified in extending development work and improving production methods in order to give the United States a guaranteed supply from abroad."

Stanray to Build Car to Carry Spent A-Fuel

A contract for the transportation of spent fuel from the N.S. SAVANNAH, the world's first nuclear-powered merchant ship, has been awarded by the Maritime Administration to Stanray Corporation of Chicago. The N.S. SAVANNAH is scheduled for extensive sea trials by early spring.

The award marks the first contract for the transportation of large quantities of nuclear power reactor spent fuel elements with privately owned and operated equipment.

The contract provides that Stanray will design and construct this equipment and be responsible for the loading, shipping and unloading of the spent fuel elements. The transport unit itself is a stainless steel container, 11 feet high, 5 feet wide, weighing 55 tons and having 10-inch thick lead walls, mounted on a special railroad car. Fuel elements will be carried by this unit from pierside to a reprocessing plant for the recovery of remaining valuable uranium.

R. A. Williams, Stanray president, said the work will be performed by the company's newly established nuclear transportation section which will offer such a service to the entire nuclear industry.

Performance under the contract will be an integral part of the fuel management system of the N.S. SAVANNAH. Services to the ship by Stanray is expected to be initiated some time during 1962.

New All Climate Unit for Highway Trailers

Worthington Corporation, producer of air conditioning, refrigeration, and heavy industrial equipment, announced its entry into the transportation field with a refrigeration-heating system for use on highway and railroad piggyback trailers.

The new unit has undergone tests in every climate condition in the last year, said Worthington officials. It automatically provides either refrigeration or heating as required, with automatic defrosting.

Two New ASF Plants to be Completed This Year

According to recent announcement by President Joseph B. Lanterman, American Steel Foundaries, construction of two new plants is proceeding on schedule. These are a steel pipe coating and wrapping plant at North Lima, Ohio, to be completed this spring, and a plant at Bensenville, Ill.

THE STORY of ALUMINUM

The EARLY YEARS

Dr. P. V. Faragher

WHILE most of the metals in commercial use date back to prehistoric times, a few particles of aluminum were produced in 1825 by Oersted, a Danish scientist, using a chemical reduction method. Thirty years later the process was perfected sufficiently to permit Henri Sainte-Claire Deville to prepare a bar of the metal which he exhibited at the Paris Exposition. Napoleon III, intrigued by the possibility of using this new light metal to equip his army, encouraged Deville to expand his operations. By 1859, production had reached two tons per year; its use was confined to novelties and jewelry items, and the price had dropped from $90 to $17 per pound.

By 1885, when Charles Martin Hall graduated from Oberlin College, the metal was in commercial production and the price had dropped to $8 per pound. Hall had studied with Professor Jewett, a former student of the German chemist Woehler who was the first to produce sufficient aluminum to measure its specific gravity and determine some of its physical properties.

Hall's First Attempts

Hall was very much interested in the possibility of finding a process for liberating aluminum from the compounds in which it occurs in nature more abundantly than any other element except oxygen and silicon. He was convinced that the deposition of the metal by means of the electric current would be the answer, even though efforts to electrolyze water solutions of aluminum salts resulted only in the decomposition of the water into hydrogen and oxygen and not in the plating out of the metal as is the case with other common metals. Working in a laboratory improvised in the family woodshed, his attempts to liberate aluminum from its compound with oxygen, called alumina, were unsuccessful because of the extremely high melting point of the oxide, a temperature which he was unable to reach with his furnace. He then looked about to find a material that would dissolve alumina and produce a solution that would conduct the electric current but which, unlike water, would not itself be decomposed by its passage. Many substances were tried but without success, because either he could not melt them with the gasoline-fired furnace he had made, or the molten material would not dissolve the alumina which he added. Finally realizing that cryolite, a mineral found in Greenland, was used as a flux in other metallurgical operations to form a low melting slag with the metal oxides, he tried this material. Although it melts at 1800°F, he was able to melt it in his furnace. As he had hoped, the resulting liquid dissolved the alumina which he added, and the resulting solution would conduct an electric current. Initial trials to plate out aluminum from the cryolite solution of alumina were without success. However, he persisted, changing from a clay crucible to one he had made from a block of carbon; finally, after passing the current from his homemade fruit jar batteries through the cryolite solution of alumina for a few hours, he poured the contents of the crucible into an iron skillet to solidify. On breaking up the mass, he found several beads of shiny aluminum.

The low-cost process for producing this interesting metal, aluminum, had at last been found by the 22-year-old Charles Martin Hall. At almost the same time, a Frenchman named Heroult, also 22 years old, working independently, had also discovered the same process. Still another 22-year-old named Castner, working at Columbia University, worked out an electrolytic process for producing metallic sodium starting with common salt, sodium chloride. Sodium was the material used in the chemical process for the production of aluminum. This means of producing cheaper sodium prolonged the life of the chemical reduction process for a time, but it could not long survive once the Hall process got under way.

New Process Cuts Costs

The process discovered by Hall was the solution to the problem of making aluminum available at a moderate price, as evidenced by the fact that it continues to be used in the production of the billions of pounds of the metal that are now required annually. However, at that time there was practically no demand for the metal and capital was not readily available to finance the commercial development of the process. For two years, Hall traveled from city to city trying to find someone who could see, in a few shiny pellets of aluminum made in a woodshed laboratory, sufficient promise to risk his money in developing the process. Finally, from Romaine Cole whom he met in Lockport, New York, he learned that Captain Alfred E. Hunt, a metallurgist and co-owner of the Pittsburgh Testing Laboratory, was interested in aluminum and had also worked on the problem of producing it.

This article—"The Story of Aluminum—The Early Years" has been summarized from initial chapters of the book "Fundamentals of Aluminum" by Dr. P. V. Faragher with the permission of the Aluminum Company of America. Dr. Faragher, associated with ALCOA for over 37 years, was previously Chief of Specifications of the Metallurgical Division. The presentation of this historical review is to implement the intent of the Jackling Bequest to the Western Society of Engineers.

In the summer of 1888, Cole arranged for Hall to meet Hunt who became convinced of the merits of the process. Hunt persuaded a group of his young friends in the steel industry to join him and his partner, George Clapp, in pledging $20,000 to form a corporation to exploit the process. It was agreed that if it proved possible to operate Hall's process on a commercial scale, the capital stock would be increased and Hall would receive a substantial number of shares in exchange for his patents.

Price Drops to $2 Lb.

At a meeting in Captain Hunt's home on July 31, 1888, steps were taken to form The Pittsburgh Reduction Company. A small plant was built on Smallman Street in Pittsburgh and operations were started in November of that same year. A young man, Arthur Vining Davis, recently employed by Pittsburgh Testing Laboratories, was transferred to aid Hall in operating the new plant. On Thanksgiving Day, 1888, they poured the first pig of aluminum produced by the electrolytic smelting process. The practicability of the process having been proved, it was now only necessary to expand the operations in order to meet the demands for this interesting new, light, corrosion-resistant metal. But there was no demand, in spite of a price lowered from $8 to $5 and then to $2 per pound.

Aluminum Teakettle

Then began the problem that has been continually present in the industry, that of creating markets for the metal. Davis entered enthusiastically on this problem, but soon found that it could not be solved merely by offering aluminum ingot for sale. In his first contact, he convinced a large manufacturer of cooking utensils that a cast aluminum teakettle would be superior to the iron one he was making. He received an order, not for ingot from which to make the kettles, but for 2,000 kettles. Not knowing the problems that would have to be solved before the kettles could be successfully produced, the customer decided that, whatever they might be, they should be solved by the company that wanted to sell the metal.

Other prospective customers expressed an interest in aluminum sheet. When Davis approached companies having equipment for the production of brass and copper sheet with the proposal that they expand their operations to include aluminum sheet, he encountered the same lack of interest. They had no experience in rolling aluminum and had enough problems with their present operations without adding unknown new ones.

Two orders for substantial quantities of aluminum wire for electrical conductor lines were taken. Efforts to have the copper wire mills produce the aluminum wire were met with refusal. Thus, The Pittsburgh Reduction Company was forced to expand its operations to include a foundry, mills for rolling sheet and rod, and wire drawing equipment. Necessity rather than choice brought about the integrated aluminum industry.

The substitution of electricity for metallic sodium to liberate aluminum from its compounds still left an appreciable item of cost. Approximately 10 kilowatt-hours of electrical energy are required to produce one pound of aluminum. Stated another way, the quantity of electricity needed to make the aluminum for just the pistons in the family automobile, about eight pounds, would be sufficient for the requirements of the average home for about two weeks. With the coming of the Niagara Falls hydroelectric development, the company moved its smelting operations from Smallman Street in Pittsburgh and from New Kensington, some 20 miles up the Allegheny River from Pittsburgh, where the inefficient steam engines that were then available were used to generate the electricity for the smelting of the metal. The company became the first customer for power at Niagara Falls. The lower cost of the hydroelectric power further reduced the cost of producing the metal.

Low Cost Power

As the demand for aluminum increased, more low-cost electricity was required. A smelter was built at Massena, New York, to use power generated at the nearby rapids in the St. Lawrence River. The further search for power led to developments across the border in Canada, although subsequently all of these properties were disposed of. Next, several dams and power projects were built in the watershed of the Little Tennessee River in North Carolina and Tennessee, and a smelter was built near Knoxville at a site now known as Alcoa.

As the company expanded and its operations spread over a greater area, its name was changed in 1907 from The Pittsburgh Reduction Company to Aluminum Company of America, from which came the company's trademark Alcoa. In recent years, the company is better known in the press and to the man on the street by the name Alcoa than by its corporate name.

In 1913, the Southern Aluminum Company, a French company, began the development of power facilities further east on the Yadkin River near Badin, North Carolina. When war broke out in Europe in 1914, they had to abandon the project for lack of funds, and the property was sold to Alcoa. The project was expanded and completed by the company and is now Alcoa's Badin Works.

World War I saw an increased use of aluminum in military planes as well as in accessory equipment, such as mess kits and canteens. To meet this demand Alcoa increased its production of aluminum by nearly 50 per cent—from 109 million pounds to 152 million pounds or under the terminology of today, from 54.5 to 76 thousand tons. Ninety per cent of the output went into military applications.

New Alloys

During the succeeding 20 years, there was a substantially increased use of aluminum. The development of the high-strength, heat-treatable alloys made the light metal suitable for engineering applications for which the older alloys did not offer attractive advantages. By 1939, production had reached 327 million pounds or 163.5 thousand tons, more than three times that at the end of World War I. Even before the end of the depression of the 1930's, Alcoa undertook a self-financed expansion program involving $300 million. Prior to the entry of this country in the war, a military group, after visiting Alcoa's key plants, issued a report that the existing facilities would be adequate for their anticipated needs. The ink was hardly dry on the report before changed thinking on the role of military aircraft made it obsolete. The aircraft sheet plant which they visited had a capacity of 5 million pounds per month. Before the war was ended, monthly shipments from new facilities built and owned by Alcoa at that location reached more than 10 times that amount. There were in addition two other plants of nearly equal potential capacity in operation at other locations.

(Continued on page 22)

WASHINGTON AWARD — 1961

William V. Kahler
the Recipient for 1961

On March 2nd members and friends of the Societies participating in the Washington Award attended the conferment upon Mr. Kahler at the Furniture Club of America. Following an informal reception at 5:30 p.m. and a dinner at 7:00 p.m., Virgil E. Gunlock, chairman of the Washington Award Commission offered his remarks. Presentation of the token of the award was made by Raymond D. Maxon, president of the Western Society of Engineers. Mr. Kahler was chosen by the commission for "distinguished leadership in business and civic affairs and for exceptional service to education and humanity." (The Commission represents the American Society of Civil Engineers, American Institute of Electrical Engineers, American Institute of Mining, Metallurgical and Petroleum Engineers, American Society of Mechanical Engineers and Western Society of Engineers. Western Society administers the award.) Following the presentation, Mr. Kahler delivered his address entitled "Plowing A Straight Furrow."

WILLIAM V. KAHLER, 1961 recipient of the Washington Award, is recognized for his outstanding contributions to industry, the engineering profession and public affairs. Identified with the telephone business for nearly forty years, he has been president of Illinois Bell Telephone Co. since 1951.

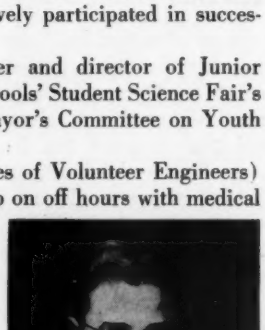
He was born September 30, 1898 in Mendon, Missouri. He received a B.S. in Mechanical Engineering from the University of Missouri in 1922 and started in the telephone business with Bell Telephone Laboratories in New York. After two years he transferred to Illinois Bell and in 1930 returned to New York to work for A.T.&T. He became chief engineer of Illinois Bell in 1938.

From 1940 to 1943, he was "on loan" to various federal government agencies in Washington. Returning to Illinois Bell, he advanced rapidly to his present office.

It is noteworthy that he found time to do so much while carrying a full schedule of telephone executive responsibilities. He was president of the Western Society of Engineers in 1947-48 and became a director of the John Crerar Library in 1950. He was the 1953 campaign chairman of the Community Fund of Chicago and has actively participated in successive drives.

Interest in youth caused him to become an early supporter and director of Junior Achievement. In 1958, he was chairman of the Chicago Public Schools' Student Science Fair's first Business-Advisory Committee. He is now serving on the Mayor's Committee on Youth Welfare.

Bill Kahler conceived the idea of "SAVE" (Service Activities of Volunteer Engineers) in which some 47 Illinois Bell engineers and technicians team up on off hours with medical researchers. Some of the devices developed are now helping to combat cancer, heart disease and respiratory ailments.



As president of Telephone Pioneers of America in 1958-59, Mr. Kahler aggressively promoted community service as a fundamental function of this international association of 200,000 telephone people with 21 or more years of service in the industry.

He is also a trustee of the Illinois Institute of Technology, University of Chicago, MacMurray College, and a fellow of the American Institute of Electrical Engineers.

Mr. Kahler has received a number of honorary degrees and awards: the University of Missouri Honor Award for Distinguished Service in Engineering in 1951; from Rose Polytechnic Institute in 1953 the honorary degree of Doctor of Engineering; from the United States Navy in 1954 its Distinguished Public Service Medal; from W.S.E. in 1955 an honorary membership; and from Chicago City Junior College in 1959 a citation "for outstanding service to the City of Chicago, particularly in the field of education."

Tallest Marble Structure—
—United of America Building

Rising 530 ft. above Wacker Drive, it incorporates many unusual features including use of weight-saving steels

The 41 story United of America Building now being erected at the southeast corner of State and Wacker will be the tallest marble structure in the World. White Georgia marble is used, supported by stainless steel shelf angles. Each marble pier will appear as a single white mass from the sidewalk to the roof. Dark porcelain enamel spandrel panels between the piers will emphasize the white marble.

The roof will top out 530 feet above Wacker Drive. The top floor of the building will be an Observation Gallery circling the building. The main tower portion of the building is 108 feet by 140 feet, although the entire site is 181 feet by 140 feet. Underneath the structure there are three basements covering the entire site, the lowest at 33 feet below street level. More than half of the basement areas will be parking space, the rest being used for building services and maintenance.

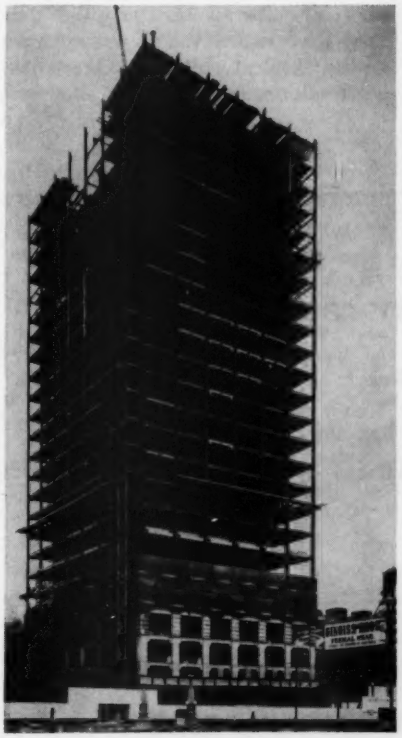
The excavation for the basements was done in three steps. Inside the peripheral steel sheet piling, general excavation was carried about half way down. Then the center portion was dug to full depth and the third basement slab poured, providing the necessary abutment for bracing of the sheet piling. Finally, the area between the center part and the sheet piling was excavated and the floor completed.

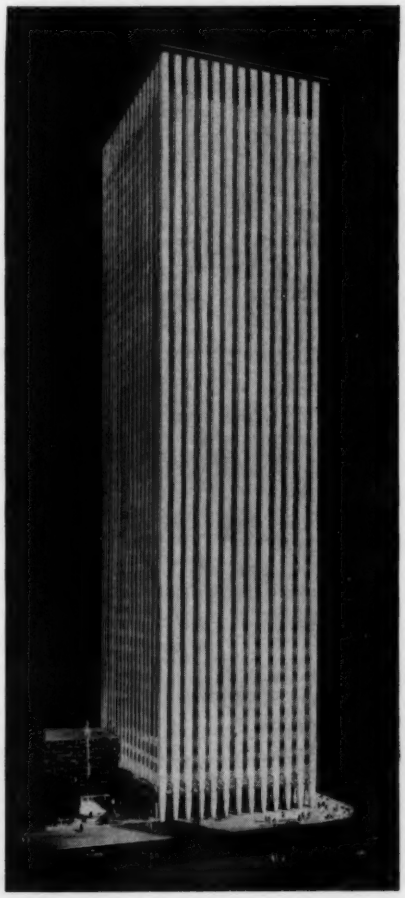
Tower Foundation

The foundation for the tower consists of 56 caissons to bedrock, which is approximately 135 feet below Wacker Drive. The caisson diameters vary from 4'-2" to 5'-4". All bottoms were cored an additional eight feet, and one caisson required 20 more feet of depth to obtain adequate bearing. All of these caissons were dug by hand over a period of less than three months. To verify the condition of the concrete, two of the caissons were cored for their entire depth.

The superstructure consists of 7800 tons of structural steel supplied by United States Steel Company and erected by American Bridge Division.

Columns are erected in three-story lifts by means of a stiffleg derrick mounted near the center of the tower. There are 16 column lifts in all for the 41 stories above the first floor and three basements. In the lower nine lifts, up to the 23rd floor, columns are of Man-Ten (A440), a high-strength steel. The rest of the structure is conventional A-7 steel. The use of Man-Ten columns resulted in a total weight saving of 800 tons and a cost saving of about $45,000.





Recent view—left—shows superstructure using 7800 tons of steel. Right—how building will appear as a single white mass. Dark spans between piers will emphasize whiteness.

Column-girder bents will resist the lateral wind forces as there is no cross-bracing in the building. Because of the building's extreme height to width ratio, the cantilever method of wind design was used. Thus, connections at the interior columns are somewhat heavier than those at exterior columns. Split beam stubs are welded to the floor girders at the connections to provide variable connection depth. The proper proportioning of members was checked by the Witmer Method of K-percentages. In a few cases auxiliary force systems solved by simultaneous equations were used to yield a precise check on wind force distribution. High tensile strength bolts are used for all field connections, while shop connections are riveted.

To provide maximum flexibility of electrical and telephone service, the rentable floor area throughout the building is constructed of a cellular metal deck covered by two and one half inches of light-weight concrete.

The building was designed by Shaw, Metz and Associates, Architects and Structural Engineers; John Dolio and Associates, Mechanical Engineers. A. L. Jackson is the General Contractor and L. J. Sheridan the Rental Agent.

Chicago AIA Gives Its 24th Refresher Course

The 24th Annual Refresher Course sponsored by the Chicago Chapter of the American Institute of Architects will start this year on March 30. Registration is at the Chapter office—221 North La Salle Street, between 10:30 A.M. and 4:00 P.M. in person; no registrations by mail. The charge for the course is $110.00 paid in advance with registration.

The first seven classes will cover client counseling, project administration, supervision of construction, uses and selection of materials, and some history of architecture; taught by Walter H. Sobel, A.I.A. The next six classes cover heating, ventilating, plumbing, electrical and related mechanical work; taught by Harry Nachman, consulting engineer. The last 27 classes will cover all elements of structures for buildings in wood, steel, and concrete as well as graphics; taught by Frank Kornacker, structural engineer. A summarizing panel session will apply all lesson materials to a specific project.

Members of the Chicago Chapter, A.I.A., Education Committee are: Chairman—Walter H. Sobel, Dan Brenner, Earl R. Benedict, Richard Carlson, Charles Egli, Phillip LeBoy, Paul McCurry, Albert Nemoede, Joseph Slovinec, Fred Wiesinger.

Pavement Joint Heater

An infra-red joint heater, developed by Pavement Salvage, Inc., Pittsburg appears to meet the problem of achieving a perfect joint bond between new hot material and an existing pavement. This propane gas heater attachment can be welded to the side of a paver in a matter of minutes. It brings a cold pavement joint back to a working range of 200-275° F for annealing to the new material very quickly. This was reported in the Asphalt Institute Quarterly's recent edition.

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Nominating Committee Reports

The report of the nominating Committee for officers and trustees of the Society, and members of the Washington Award Commission to be known as the Regular Ticket, was approved by the Board of Direction, January 26, 1961.

The nominations reported by the Committee were as follows:

Officers and Trustees:
President, P. L. Coleman
First Vice President, F. M. Scott
Second Vice President M. V. Maxwell
Treasurer, E. R. Hendrickson

Trustees (for three years), vote for four:
- R. H. Bacon
- V. E. Gunlock
- W. V. Sayner
- E. G. Benson

Members of Washington Award Commission (for a three year term), vote for two:
- A Past President, R. D. Maxson
- A member, neither a Past President nor a member of the Board nor a candidate therefore, H. A. Carter.

Corporate Members of the Society are hereby notified of the above nominations for the Regular Ticket.

The Constitution (Article X, Section 5) provides that: "Additional nominations for any office provided for in Sec. 4 of this Article may be made by petition signed by at least twenty Corporate members. Such petition shall be accompanied by the acceptance of the nomination by each nominee in writing and shall be filed with the Secretary of the Society before the twentieth day of March. Any petition so filed shall be presented to the Board of Direction at its regular March meeting. If the Board shall find any person so nominated ineligible for the office for which he is nominated, the petition as it relates to such nominee shall be rejected. Nominations made in accordance with this section shall be known as a Ticket by Petition."

Northwestern Computer Center to Get IBM 709 in July

Expanding research necessitated acquisition of new unit having 50 times the capacity of present computer.

One of the biggest electronic computers now in use, the IBM 709, will be installed at Northwestern University next July, President J. Roscoe Miller has announced. The computer has roughly 50 times the capability of the unit now in use here, reported Harry Rymer, director of Northwestern's Computer Center. The Center now operates a 650 model, also made by International Business Machines.

An amazing boost in demand for the computer by University researchers necessitated acquiring the new unit, Rymer explained. The 650 computer now is used roughly four times as much as three years ago, when the Computer Center was formed. Last summer it was used more than 300 hours per month, forcing the Center's crew to work three shifts.

Open to all University projects, the Computer Center was used about 1,500 hours during the 1959-60 school year. About 70 per cent of its time was given to research projects of faculty and graduate students.

Excited about the new computer, Rymer explained that it will not only permit more work to be turned out, but also will permit tackling much larger individual problems. For instance, University astronomers Allen Hynek and Karl Henize hope to compute speedily the orbits of artificial earth satellites from radio signals. Computer results should permit aiming optical-tracking cameras at the correct spot ahead of time, and on an early pass of a new satellite.

Diversity of projects is another interesting aspect of the Center's work. Most departments at Northwestern have come to the Center for problem-solving help, including the English department, Business School, Technological Institute and the physical and social science departments.

Biggest users by far are the Technological Institute and the Liberal Arts college (primarily physical and social sciences), Rymer explained.

But typical of the diverse nature of problems are these which will be fed to the 709:

—The English department hopes to find if the authors of anonymous literary works can be tracked down from traits of known authors, and if several anonymous works have common authorship.

—Another group hopes to use the 709 to hunt for common elements in chemical formulations; a special language would be designed to represent formulations.

—The School of Business will use the 709 to simulate company operations and practices, in a study of business systems.

Though faculty and graduate-student research is the Center's main job, about 30 per cent of its time is given to formal courses. Computers are one of the important new research tools for solving problems of all types, so students and faculty are flocking to courses offered.

Last year 186 students took three courses the Center offers in computer use and programming. Another 85 graduate students are taking a special course showing them how to use the computer in their research. Rymer notes that qualified users operate the computer themselves because the experience is valuable, even though it might be more efficient for his staff to operate it.

Speed of the big, new 709 is impressive. James Van Ness, professor of electrical engineering and chairman of the University computer center committee, reports this experience: When solving a large problem on a similar computer, he found just after pushing the Start button that he hadn't told the computer to print the answer. By the time he stopped the machine after just a few seconds, it had solved the problem—one which would take an hour on the 650. Computers actually open up for solution a whole new range of problems, Van Ness states. Engineers in industry have told him that jet planes, for instance, couldn't have been built without computers, because of the huge volume of problems involved in designing them.

The Computer Center is now in Dearborn Observatory, but the 709 will be installed first in an electrical engineering laboratory of Tech. When a $7 million addition to Tech is completed, probably in 1962, the enlarged Center will move into it.

Micro-size Capsules Qualify as World's Smallest Containers

Scientists have "packaged" substances in capsules one twenty-five-thousandth of an inch in diameter—about the size of one of the smaller type of bacteria. The process is called microencapsulation. A clever trick, one might say, but does it have practical application? The answer is most definitely yes.

One of the original processes of microencapsulation was based on discoveries made in studies on how living cells are formed. Industrial applications involving microcapsules and a microencapsulation process have been patented by National Cash Register Company. Essentially, the NCR process involves depositing a polymer film (originally gelatin and gum arabic) around a material to be encapsulated. NCR first developed microcapsules of a colorless dye that, on contact with a reagent, gives color. A coating of the minute capsules was applied invisibly to a sheet of copy paper, so that ordinary writing or typing pressure ruptured the capsules to release the dye. This then is a replacement for carbon paper.

That was the beginning. Since then, a host of possible uses for microencapsulation have been under development. NCR has adopted a broad industry licensing policy under their patents. Stanford Research Institute has agreed to conduct research in capsular technology for NCR licensees.

A look at some of the properties of microcapsules suggests ways in which the process might be applied. To begin with, a wide variety of substances can be encapsulated, including solids or liquids, and possibly gases under pressure.

Space permits mention of only a few of the many suggested applications for microencapsulation techniques. For example, water-soluble capsules containing pesticide or fertilizer could release their chemicals slowly over a period of time to prevent loss by evaporation or decomposition.

Perishable nutrients in foods likewise can be preserved by the process.

Going from the dining table to outer space, mutually reactive agents in solid rocket fuels might be enclosed in microcapsules that are broken down by the heat of firing. Even the capsule wall could contain a catalyst to speed the chemical process when ready.

Among the controllable variables in the microencapsulation process are capsule size, contents, wall material, wall strength, wall permeability, wall additives, mass state, and the means and rate of release. (Stanford Research Institute, Menlo Park, Calif.)

A Tip on Translations of Russian Articles

A woman electrical engineer cautions on evaluating English translations of Russian technical articles that may have been prepared by persons familiar with both languages but not with engineering terms.

The warning was given by Mrs. B. O. Buckland, General Electric Company, Schenectady, N. Y., in a paper, "Reading Electric Heating Papers in Russian," delivered at an electric heating symposium.

"A point not to be overlooked is evaluation of an English translation of a Russian article," she said. "Someone at home in the Russian language but not in the electrical heating field, may choose the wrong word from a dictionary, with a result puzzling to the engineer. Elemental knowledge of the alphabet will enable the engineer to look up the definitions of the word and choose the right one."

The Russian magazines Electrichestvo and Teploenergetika now have tables of contents in English, but this is not true of many other Russian publications, she pointed out.

Knowledge of the Russian alphabet is necessary to scan Russian technical articles Mrs. Buckland said. "The mysterious look is apt to act as a deterrent until one realizes that many of the letters are Greek and English. Pronunciation is just as important, since many words are taken bodily from another language and spelled to make the sound come out the same as in the original language. This happy circumstance comes about because of the international aspect of the exchange of technical information."

Radar Beams May Unlock Trapped Oil Reserves

Deep-penetration radar beams may provide the necessary heat to unlock oil reserves trapped in rock thousands of feet beneath the earth's surface, *Electronics*, McGraw-Hill publication, reports. An electronics firm is packaging 5,000 to 10,000 watts of microwave power into a capsule six inches in diameter. Oil is expected to rise to the surface after the capsule—lowered down a wellbore—provides heat needed to raise the temperature of molasses-like oil some 20 degrees.

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"Atomic Spotlight" Is Versatile Instrument

Argonne National Laboratory moves into its fifteenth year in 1961 as a center for exploring the basic properties of the atomic nucleus and developing uses for these properties.

Many kinds of scientific research are carried on there at Argonne, Ill., ranging from applied mathematics to zoology.

One of the most versatile instruments at Argonne is a giant "atomic spotlight," developed several years ago to make contributions to Argonne's basic research work. This instrument, called a biological spectrograph, is the world's largest of its type. It is used to determine the reactions of living organisms to different wave lengths (colors) of light. The spectrograph serves as a molecular spotlight, enabling scientists to learn more about the molecules that make up plant and animal cells, and particularly which ones react to light upon absorbing it.

One recent project in which the spectrograph was used involved resetting, through use of different colors of light, the natural physiological "time clocks" that exist in all cells. One-celled animals called paramecia were exposed to different wave lengths of light at various times. Research workers found that the animals' "clocks" could be reset easily by exposure to ultraviolet light. Typical effects were alteration of mating response and alteration of basic chemical activities of the cells. This, in turn, could be reversed by exposing the paramecia to longer wave lengths, such as blue violet in the visible spectrum.

Argonne scientists believe that once they understand the chemistry of nature's time clocks, they will have a way to probe the mechanism that controls wakefulness and sleepiness in humans.

Modular School Saves Elmira, N.Y., $174,000

The Elmira, N.Y. School System has authorized the construction of a steel modular school for 1,600 students at a saving of $174,000 under original estimates—despite an increase of 7,962 square feet in building area. Completion is scheduled for late this year, approximately nine months after steel construction starts in March.

The Broadway School will be outstanding in many respects: First: It is the largest school ever designed to utilize the Ambridge modular school system developed by the American Bridge Division of United States Steel Corporation. Second: The project cost of $14.86 per square foot will be nearly $1.00 per square foot below the established estimate of $15.85 and $2.00 to $3.00 per square foot under the New York statewide average of $17.00 to $18.00 for school construction. Third: The total cost will be $174,000 under the budgeted amount despite an increase of 7,962 square feet in building area provided by the final plans. Fourth: The construction schedule is believed to be the shortest ever drawn up for school projects of this size. Other schools of comparable magnitude have required up to two years to complete using conventional building methods.

The main structural portion of the school will consist of square tubular columns totaling about 166 tons in weight, long-span joists weighing 67 tons, standard joists weighing 210 tons, and 150 tons of steel in the floor and roof.

The exterior walls will utilize steel panels factory assembled in units four feet wide by 11 feet high, incorporating the sash. Outside surfaces of the panels will be given a lasting finish of colorful porcelain enamel, while inside surfaces will be covered with textured vinyl applied to the steel sheets at the rolling mill.

An unusual application of steel scaffolding is found in the construction of a ski jump at the Fair Grounds, Pomona Calif. Steel frames, rigidly cross-braced support a 120 ft. high wooden runway, covered with artificial snow.

Applications

Richard A. Young, Designer in Charge, Long-Airdox Co., 307 N. Michigan Av.

Eugene E. Anderson, Inspector, Commonwealth Edison Co., 72 W. Adams St.

Leonard Alfredson, 1936 Sheridan Rd., Evanston, Ill.-attending Northwestern Technological Institute.

J. Ronald Murray, Asst. Dist. Sales Mgr., The Babcock & Wilcox Co., 105 S. LaSalle St.

Harry J. Plesha, Equipment Engineer, Western Electric Co., Inc., Merchandise Mart Plaza.

Richard F. Beattie, President, Wm. J. Scown Building Co., 5430 N. Milwaukee Av.

Oscar A. Anderson, Engineering Consultant, 600 S. County Line Rd., Hinsdale, Ill.

J. R. Berendes, Sales, Henry Vogt Co., 140 S. Dearborn St.

Sheldon M. Bolker, Senior Mech. Engr., Motorola, Inc., 1450 N. Cicero Av.

Frederick B. Callanen, Staff Engineer, Pure Oil Co., 200 E. Golf Rd., Palatine, Ill.

Joseph E. Danes, Engineer, Kaybee Engineering Co., 100 E. Quincy St., Westmont, Ill.

S. M. Davison, Jr., Vice President, Dacor Corp., Box 551, Evanston, Ill.

George S. Gralewski, Senior Des. Checker, Admiral Corp. - mail: 3804 Brummel St., Skokie, Ill.

Harvey J. Green, Junior Engineer, Acme Steel Co., - mail: 10144 S. Luella Av.

Leonard E. Hanno, Steam Engineer, Corn Products Co., Argo, Ill.

Henry H. Hemenway, Vice Pres.-Res'h. & Engrg., Graver Tank & Manufacturing Co., 4809 Tod Av., East Chicago, Ind.

Louis J. Lucas; Consulting Management Engineer, 2211 W. Touhy Av.

Professional Directory

CURRENT COMMENT

ESTABLISHMENT OF A NATIONAL SCIENCE ACADEMY has been proposed in legislation introduced by Representative Victor Anfusco of New York. Paul H. Robbins, executive director of the 54,000-member National Society of Professional Engineers, says that while the Anfusco bill recognizes most of the basic problems involving engineering and scientific manpower, its approach toward a solution of these problems would involve unnecessary duplication and expense.

A news release from the Society quotes Mr. Robbins to the effect that: "There is no need, as far as we can determine, for the Federal Government to spend time, effort and money to establish an Academy for the undergraduate and graduate education of engineers and scientists. Our colleges, and universities, are presently capable of handling considerably more engineering and science students both at graduate and undergraduate level. A Federally-sponsored institution would only serve to duplicate facilities, to say nothing of the drain the proposed Academy would have on the already short supply of qualified instructors and professors."

Mr. Robbins said that the Society was in accord with Anfusco's position on the need for an expanded program of Federally-sponsored graduate fellowships at accredited colleges and universities.

PRESENT TAX STRUCTURE is one of the major roadblocks to the faster growth of our economy, states a recent issue of the Washington Report of the Chamber of Commerce. Pursuing this subject it presents some comments of Arthur H. Motley, National Chamber president and publisher of *Parade Magazine*. These were made in a speech before the Economic Club of New York and emphasized Mr. Motley's warning that those who feel we should be stepping up our rate of economic growth should realize the price to be paid to achieve this objective. He said proponents of faster growth must give up some of their demands for more leisure and that more growth would be stimulated by elimination of featherbedding and an end to proposals for a shorter work week. He added faster growth will mean "disturbing and structural changes in our economy. It will mean obsolescence of products, whole industries, skills and jobs. Because of the importance of this subject the Chamber has issued a booklet, 'The Promise of Economic Growth.'" (Single copies are $1.)

New Nuclear Fuel

Uranium Monocarbide, a new fuel with great promise for high temperature nuclear reactors, is now available in laboratory quantities from Vitro Corporation of America. It is being supplied from Vitro's West Orange, N. J., Laboratory, according to an announcement by company officials.

The material is available as granules or as high density spheres of from 200 mesh to 5/16" diameter in size. UC is attracting considerable attention in atomic energy because it combines high thermal conductivity, melting point and uranium density with an excellent irradiation stability.

Reviews of Technical Books

Engineering Professionalism in Industry

Engineering Professionalism in Industry, made under the sponsorship of the Professional Engineers Conference Board for Industry, in cooperation with the National Society of Professional Engineers, Washington 6, D. C. Pages, 104. Price, $4.00.

This interesting survey was made by Opinion Research Corporation on the basis of extensive "depth interviews" with engineers and managers.

Primary objective of the study was to find out what engineers and engineering managers mean by professionalism, and how they think it can be advanced. The engineers and managers interviewed all work for large companies that employ many engineers and are located in various parts of the country. Six major industries are represented in the sample: chemicals, machinery, electronics, petroleum, rubber, aircraft manufacturing, and electrical instruments.

One of the findings reported in the survey is that one out of four engineers are thought of as second class professionals, but no industrial managers agree with this opinion. The study concludes that there needs to be a greater meeting of the minds on what professionalism means and how it can be achieved, in short, more two-way communication. Management needs to make clearer its desire to promote individual responsibility on the part of engineers and to become more aware of the wide range of engineers' aspirations.

W.L.R.

Past and Future of Energy Resources

Energy in the American Economy 1850-1975, by Sam H. Schurr and Bruce C. Netschert with Vera F. Eliasberg, Joseph Lerner, and Hans W. Lansberg. (Johns Hopkins Press, Baltimore, 774 pp. $12.50.) This volume comprehensively traces the consumption of fuel from reliance on wood burning through the coal age and also deals with present use of oil and natural gas. It then considers demands and supplies likely up to 1975.

It is indicated in data cited that the United States uses energy—largely from mineral fuels—that is more than one-third of the world's total supply. Factories and plants account for the major share. Next comes transportation, including private automobiles. Then the country's homes account for a large part: electricity, gas, oil and coal.

The authors forsee that in 1975 this country could meet its demands for energy from the domestic materials now used with no large increase in costs. This opinion is based on our resource position and assumed technological advances.

The book tends to remove concern for the so-called lavish use of resources. It also does point out that we are likely to import a large amount of energy producing materials. Finally, it says that in an emergency the country could survive depending on its own resources in the energy producing categories.

Guide to Design Criteria for Metal Compression Members

Guide to Design Criteria for Metal Compression Members, made under the sponsorship of the Column Research Council Engineering Foundation, Ann Arbor, Michigan. Pages, 93. Price, $5.00.

This guide is a result of the activities of the Column Research Council over the past several years. It deals primarily with metal column problems.

The results of Column Research Council projects taken together with the results of many other investigations on the buckling strength of compression elements brought about a situation in which there is a vast amount of research information that is not applied in practice by the designer of columns or compression elements. An effort is made in the guide to present both refined and simplified procedures of design calculations and to assess the limitations of the latter.

Some of the CRC objectives are to organize and administer research projects, develop a comprehensive and consistent set of formulas or rules covering the design of compression elements. Also, to publish and disseminate original research information within the field of the council.

W.L.R.

Modern Physics for the Engineer

Modern Physics for the Engineer. Edited by Louis N. Ridenour and William A. Nierenberg. McGraw-Hill Book Company, Incorporated, New York 36, New York. Pages 383. Price $9.50.

The present volume comprises a second series of lectures coordinated by Dr. William Nierenberg, and given during the academic year 1957-1958 at various institutions throughout the State of California.

Modern engineering is founded on experimental and theoretical work in the sciences as well as on experience gained from centuries of engineering practice. In recent years the time interval between scientific discovery and technical application has narrowed to the point where there is now no visible interval between the two.

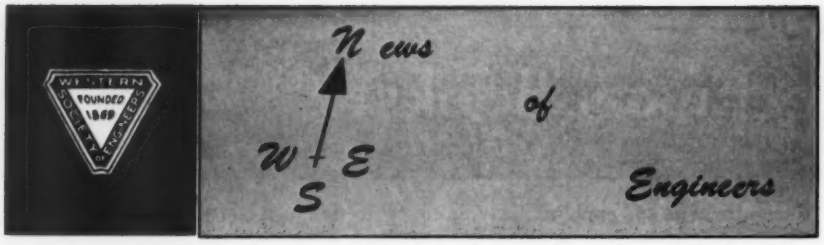
Following the technical organization of the earlier volume, it is divided into three main parts dealing respectively with the Laws of Nature, Man's Physical Environment, and Technology. Many of the discussions are useful as collateral study for the engineer in any field.

Considerable uniformity is achieved in the complex discussions considering the many authors engaged in preparing the manuscript. A major portion of the book is devoted to classifications and correlation of physical and natural phenomena.

W.L.R.

Four Flat Cars Used to Haul 172' Girder

Early this year twelve 172 foot long all-welded steel girders were shipped from Gary, Ind. for use in the Little Rock, Arkansas-North Little Rock Expressway. Fabricated by U.S. Steel's American Bridge Division, the enormous girders weigh 43 tons each. Four flat cars are required to haul one girder.



or: Personals of Personable People

Dr. A. Allan Bates, vice president for research and development, Portland Cement Company was the recipient of the 1960 Kennedy Award at luncheon ceremonies at the convention of the American Concrete Institute held during the last week in February in St. Louis. The Kennedy Award, in the form of a framed scroll, was established in 1958 in memory of the late Henry L. Kennedy, a past president of ACI.

Dr. Bates is a scientist and Chemical engineer with broad international experience in industrial research. He spent much of the summer of 1960 touring the Soviet Union as chairman of a delegation of cement, concrete and construction technologists. The delegation was sponsored by the National Academy of Sciences and the U. S. State Department and was given free access to research and development institutes, factories, and construction operations in all areas of the Soviet Union. He holds degrees from Ohio Wesleyan University and Case Institute of Technology, Cleveland. His doctor of Science degree, "magna cum laude," was conferred by the University of Nancy, France. Currently, Dr. Bates is president of the American Society for Testing Materials.

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Martin Reinheimer has been made a partner in the architectural firm of Hirschfeld & Pawlan, thus changing the name of the firm to Hirschfeld, Pawlan & Reinheimer.

Donald L. Stephens, executive vice president, was elected president of *Stephens-Adamson Mfg.* company, Aurora, succeeding his father, L. S. Stephens who was elevated to board chairman.

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Three major grants totaling $310,000 have been made to the environmental engineering program at Northwestern University. John Logan, program director and chairman of the civil engineering department, says the grants, all from the U. S. Public Health Service, will be awarded over five years. They provide for (1) graduate fellowships to permit more students to enter the field, and (2) broadening Northwestern's course offerings and research to include air pollution, urban planning aspects of environmental engineering, and sanitary chemistry.

Details on the three grants: A $150,000 research training grant provides for four or five graduate fellowships, which will permit more postgraduate students to join the 15 already studying environmental engineering here.

Specialists in water supply, waste supply, waste treatment and air pollution, all environmental engineering fields, are needed more than ever today, Logan notes.

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Est. 1918

Chicago	New York	San Francisco
29 E. Madison St.	8 W. 40th St.,	57 Post Street,
ST 2-2748	WI 7-5878	SU 1-5720

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C-8538 PLANT ENGR. Grad. ME May take recent grad. & train. Prefer exper. in field of metal lithography if possible or related field. Assume duties of chief plant engr., resp. for plant engrg. & maint. functions, eqpt., mach'y. & bldgs. Supv. maint. & bldg. service employees, sal. $7200/9600 loc. Chgo., employer will pay the fee.

C-8535 MANUFACTURING ENGR. BSME age 35-50; 5 yrs. exper. as mfg. specialist in industry producing small mech. & elect. products, knowl. mech. engrg. & mfg. Duties: To serve as top mfg. engr. To be source of forward thinking information. To be able to conceive operation in terms of automation & to be able to sell his ideas for a mfgr. of controls sal. $10/13,000 loc. Ill., employer will pay the fee.

C-8547 SR. DESIGN ENGR. BSME 4 yrs. machine design exper. Design of new or experimental strapping tools & mach'y. Check finished drawings of tools & accessories. Ascertain customers req'mts. Analyze new experimental designs of eqpt. & investigate complaints. Supv. & coordinate work of assigned engrs. & draftsmen for a producer & mfr. of steel & steel products, sal. to $10,500 loc. Chgo., employer will pay the fee.

C-8355 STRUCT. ENGR. BS-Arch. Eng. or CE age to 55; Design of steel & reinforced concrete structures for med. sized arch. & engrs. office specializing in indust. bldgs. Must have sufficient exper. & knowl. of bldg. construct. to be able to design efficient, econ. structures; resp. incl. analysis, design, engrg. drawings, checking shop details & decisions on matters concerning struct. matters during constr. Position requires man with ability to produce, struct. engrs. license desirable for an arch. & engrg. firm sal. to $10,000 dep. on exper. loc. Chgo., employer will negotiate the fee.

C-8506 PROJECT ENGR. RESEARCH & DEVEL. Grad. ME age to 35; 3+ yrs. exper. in research & machine design; research & devel. must have a flair for machine design & "gadgeteering." Research dept. newly created & opportunity to become asst. chief engr. to section mgr. Company mfgr. hardboard & bldg. materials sal. $7200/9600 loc. N.W. Chgo. Suburb, employer will negotiate the fee.

C-8528 STAFF MAINT. BLDGS. & GROUNDS ENGR. ME or EE: To supv. maint. crew, handle & direct personnel. Complete knowl. of all mech. & elect. facilities. Present time one new research bldg. is involved, however, expansion program is under way involving a 10 acre area on which other bldgs. will be constructed & candidate will be resp. for the maint. & installation of eqpt. on these, sal. $8500/10,000 loc. Chgo., employer will pay the fee.

C-8544 OWNERS REPRESENTATIVE BS degree. Considerable exper. in the layout of shopping centers. To act as owners representative, work with construction people in field to determine layout & bldg. of shopping centers is done according to specs. Must know shopping center work—no other type of bldg. work will be considered sal. $15/18,000 loc. Chgo., employer will pay the fee.

C-8545 PROCESS CHEMICAL ENGR. BS Chem. Eng. age 25-32 Process development & improvements. Will work directly under plant process engr. for a mfgr. of chem. metals, sal. $6600 loc. Calumet area, employer will negotiate the fee.

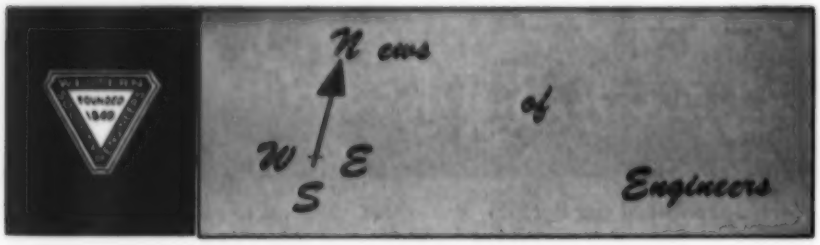
ENGINEERS AVAILABLE

MW-409 SALES REPRESENTATIVE 6 yrs. college equiv. 62; 40 yrs. in sales engrg. of heavy metal working eqpt. such as rolling mills, extrusion plants, electric weld tube mills & related eqpt. Impressive record of accomplishments sal. $12,000 Loc. Chgo. Area.

MW-410 MANUFACTURING, PURCHASING, SALES ENGR. BS Met. Engr. + Grad Courses 38; 20 yrs. diversified exper. in production & research. Journeyman machinist with 1½ yrs. tool room exper. Excellent mech. & metallurgical supv. background. Specialized in quality control, tooling, processing techs., specifications & marketing. sal. $9500 Loc. Prefer Chgo. District, but open.

MW-411 PROJECT ENGR.-DEVEL. BSME-Purdue 25; 2 yrs. Diesel engine parts devel. on pistons cylinders liners & lash adjusters. 1½ yrs. heat transfer research on nuclear fuel materials, sal. Open, loc. Chgo.

MW-412 CONSTRUCTION SUPT. BSCE 47; High apartment bldg. construction, schools, oil mill & steel mill construction sal. $9500 loc. Chgo. Area.



or: Personals of Personable People

Dr. A. Allan Bates, vice president for research and development, Portland Cement Company was the recipient of the 1960 Kennedy Award at luncheon ceremonies at the convention of the American Concrete Institute held during the last week in February in St. Louis. The Kennedy Award, in the form of a framed scroll, was established in 1958 in memory of the late Henry L. Kennedy, a past president of ACI.

Dr. Bates is a scientist and Chemical engineer with broad international experience in industrial research. He spent much of the summer of 1960 touring the Soviet Union as chairman of a delegation of cement, concrete and construction technologists. The delegation was sponsored by the National Academy of Sciences and the U. S. State Department and was given free access to research and development institutes, factories, and construction operations in all areas of the Soviet Union. He holds degrees from Ohio Wesleyan University and Case Institute of Technology, Cleveland. His doctor of Science degree, "magna cum laude," was conferred by the University of Nancy, France. Currently, Dr. Bates is president of the American Society for Testing Materials.

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Martin Reinheimer has been made a partner in the architectural firm of Hirschfeld & Pawlan, thus changing the name of the firm to Hirschfeld, Pawlan & Reinheimer.

Donald L. Stephens, executive vice president, was elected president of *Stephens-Adamson Mfg.* company, Aurora, succeeding his father, L. S. Stephens who was elevated to board chairman.

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Three major grants totaling $310,000 have been made to the environmental engineering program at Northwestern University. John Logan, program director and chairman of the civil engineering department, says the grants, all from the U. S. Public Health Service, will be awarded over five years. They provide for (1) graduate fellowships to permit more students to enter the field, and (2) broadening Northwestern's course offerings and research to include air pollution, urban planning aspects of environmental engineering, and sanitary chemistry.

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C-8538 PLANT ENGR. Grad. ME May take recent grad. & train. Prefer exper. in field of metal lithography if possible or related field. Assume duties of chief plant engr., resp. for plant engrg. & maint. functions, eqpt., mach'y. & bldgs. Supv. maint. & bldg. service employees, sal. $7200/9600 loc. Chgo., employer will pay the fee.

C-8535 MANUFACTURING ENGR. BSME age 35-50; 5 yrs. exper. as mfg. specialist in industry producing small mech. & elect. products, knowl. mech. engrg. & mfg. Duties: To serve as top mfg. engr. To be source of forward thinking information. To be able to conceive operation in terms of automation & to be able to sell his ideas for a mfgr. of controls sal. $10/13,000 loc. Ill., employer will pay the fee.

C-8547 SR. DESIGN ENGR. BSME 4 yrs. machine design exper. Design of new or experimental strapping tools & mach'y. Check finished drawings of tools & accessories. Ascertain customers req'mts. Analyze new experimental designs of eqpt. & investigate complaints. Supv. & coordinate work of assigned engrs. & draftsmen for a producer & mfr. of steel & steel products, sal. to $10,500 loc. Chgo., employer will pay the fee.

C-8355 STRUCT. ENGR. BS-Arch. Eng. or CE age to 55; Design of steel & reinforced concrete structures for med. sized arch. & engrs. office specializing in indust. bldgs. Must have sufficient exper. & knowl. of bldg. construct. to be able to design efficient, econ. structures; resp. incl. analysis, design, engrg. drawings, checking shop details & decisions on matters concerning struct. matters during constr. Position requires man with ability to produce, struct. engrs. license desirable for an arch. & engrg. firm sal. to $10,000 dep. on exper. loc. Chgo., employer will negotiate the fee.

C-8506 PROJECT ENGR. RESEARCH & DEVEL. Grad. ME age to 35; 3+ yrs. exper. in research & machine design; research & devel. must have a flair for machine design & "gadgeteering." Research dept. newly created & opportunity to become asst. chief engr. to section mgr. Company mfgr. hardboard & bldg. materials sal. $7200/9600 loc. N.W. Chgo. Suburb, employer will negotiate the fee.

C-8528 STAFF MAINT. BLDGS. & GROUNDS ENGR. ME or EE: To supv. maint. crew, handle & direct personnel. Complete knowl. of all mech. & elect. facilities. Present time one new research bldg. is involved, however, expansion program is under way involving a 10 acre area on which other bldgs. will be constructed & candidate will be resp. for the maint. & installation of eqpt. on these, sal. $8500/10,000 loc. Chgo., employer will pay the fee.

C-8544 OWNERS REPRESENTATIVE BS degree. Considerable exper. in the layout of shopping centers. To act as owners representative, work with construction people in field to determine layout & bldg. of shopping centers is done according to specs. Must know shopping center work—no other type of bldg. work will be considered sal. $15/18,000 loc. Chgo., employer will pay the fee.

C-8545 PROCESS CHEMICAL ENGR. BS Chem. Eng. age 25-32 Process development & improvements. Will work directly under plant process engr. for a mfgr. of chem. metals, sal. $6600 loc. Calumet area, employer will negotiate the fee.

ENGINEERS AVAILABLE

MW-409 SALES REPRESENTATIVE 6 yrs. college equiv. 62; 40 yrs. in sales engrg. of heavy metal working eqpt. such as rolling mills, extrusion plants, electric weld tube mills & related eqpt. Impressive record of accomplishments sal. $12,000 Loc. Chgo. Area.

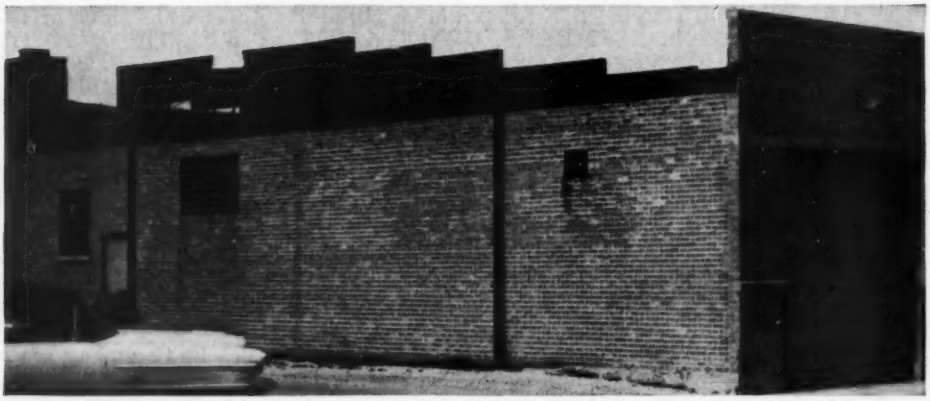
MW-410 MANUFACTURING, PURCHASING, SALES ENGR. BS Met. Engr. + Grad Courses 38; 20 yrs. diversified exper. in production & research. Journeyman machinist with 1½ yrs. tool room exper. Excellent mech. & metallurgical supv. background. Specialized in quality control, tooling, processing techs., specifications & marketing. sal. $9500 Loc. Prefer Chgo. District, but open.

MW-411 PROJECT ENGR. - DEVEL. BSME-Purdue 25; 2 yrs. Diesel engine parts devel. on pistons cylinders liners & lash adjusters. 1½ yrs. heat transfer research on nuclear fuel materials, sal. Open, loc. Chgo.

MW-412 CONSTRUCTION SUPT. BSCE 47; High apartment bldg. construction, schools, oil mill & steel mill construction sal. $9500 loc. Chgo. Area.

How an Air-to-Air Heat Pump solved this factory's problem

(and saved $3500 to boot)



This Heat Pump System called for 10 fin heat exchangers located on the roof of the plant. Each coil is approximately 3 ft. high and 11 ft. long. They serve either as a condenser or evaporator.

The problem:

The Walter Precision Company, Franklin Park, Illinois, manufactures instrument parts. The nature of the work requires year-round air conditioning. The 8500-sq.-ft., one-story plant houses 40-50 employees.

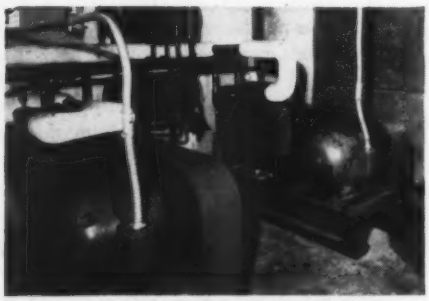
Heavy internal heat load results from high-intensity lighting, motors and people—a "plus" in winter, a problem in summer. Only high-cost well water was available, thus ruling out conventional water-cooled refrigeration.

The solution:

An air-to-air heat pump system was designed by Refrigeration Systems, Inc. Two standard 20-hp refrigerating units are used. Compressors are operated either singly or together on either heating or cooling.

Only difference from conventional air-handling equipment is the ten fin-coil heat exchangers located on the roof. They supply heat from the outdoor air in winter, get rid of indoor heat in summer.

After several years' operation, owner August Schlotfeldt describes results as "highly satisfactory". Only one compressor has been used a majority of the time, indicating more than enough capacity. Initial cost was $3500 less than cooling plus conventional heating system. Operating cost is competitive with other types.



The two 20-hp refrigeration machines can be operated together or singly on either heating or cooling.

Commonwealth Edison
AND
Public Service Company